UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/717,758	11/21/2000	Yasuhiro Morinaka	10873.603US01	1970

23552 7590 08/24/2004

MERCHANT & GOULD PC
P.O. BOX 2903
MINNEAPOLIS, MN 55402-0903

EXAMINER	
VIEAUX, GARY	
ART UNIT	**PAPER NUMBER**
2612	

DATE MAILED: 08/24/2004

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/717,758	Applicant(s) MORINAKA ET AL.	
	Examiner Gary C. Vieaux	Art Unit 2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 11-13* is/are rejected.

7)☒ Claim(s) *10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 November 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4,5,& 6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

The claims are objected to because the lines are crowded too closely together, making reading and entry of amendments difficult. Substitute claims with lines one and one-half or double spaced on good quality paper are required. See 37 CFR 1.52(b).

Claims 6 and 7 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 6 and 7 fail to include all the limitations of the claim incorporated by reference into the dependent claim, and instead present substitute claim elements. Claims 6 and 7 will still be examined on their merits as best understood by the examiner, with the substitute elements of the dependent claims to be read in place of the original, independent claim elements.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Shigera (JP #06045576.)

Regarding claim 1, Shigera teaches a solid-state imaging device, comprising:

a photoelectric conversion region including (fig. 1):

a plurality of photoelectric conversion portions arranged in rows and columns extending in a vertical direction and a horizontal direction (fig. 1 indicator 3); and

a plurality of vertical charge transfer paths extending substantially in parallel to the columns of the photoelectric conversion portions (fig. 1 area indicator 2); and

a horizontal charge transfer path for receiving signals from the plurality of vertical charge transfer paths (fig. 1 indicator 5);

wherein the plurality of vertical charge transfer paths is arranged at a horizontal pitch A within the photoelectric conversion region, and at a pitch B that is smaller than the pitch A in a portion where the signals are input into the horizontal charge transfer path (fig. 1, Abstract).

Claims 1-6, 12 and 13 are also rejected under 35 U.S.C. 102(b) as being anticipated by Kiik et al. (EP #0 866 502 A2).

Regarding claim 1, Kiik teaches a solid-state imaging device, comprising:

a photoelectric conversion region including (fig. 5):

a plurality of photoelectric conversion portions arranged in rows and columns extending in a vertical direction and a horizontal direction (fig. 5 indicator 102; col. 5 lines 22-25, col. 8 lines 10-30); and

a plurality of vertical charge transfer paths extending substantially in parallel to the columns of the photoelectric conversion portions (fig. 5); and

a horizontal charge transfer path for receiving signals from the plurality of vertical charge transfer paths (fig. 5 indicator 112);

wherein the plurality of vertical charge transfer paths is arranged at a horizontal pitch A within the photoelectric conversion region, and at a pitch B that is smaller than the pitch A in a portion where the signals are input into the horizontal charge transfer path (fig. 5 and 6.)

Regarding claim 2, Kiik teaches all the limitations of claim 2 (see the 102 rejection to claim 1 supra), including teaching a solid-state imaging device further comprising a read-out amplifier (fig. 5 indicator 108) for receiving signals from the horizontal charge transfer path (fig. 5 indicator 112), wherein the read-out amplifier and the horizontal charge transfer path for receiving signals from the plurality of vertical charge transfer paths are provided for each section into which the photoelectric conversion region is partitioned along the vertical direction (fig. 5.)

Regarding claim 3, Kiik teaches all the limitations of claim 3 (see the 102 rejection to claim 2 supra), including teaching a solid-state imaging device wherein the read-out amplifier (fig. 5 indicator 108) and the horizontal charge transfer path for receiving signals from the plurality of vertical charge transfer paths (fig. 5 indicator 112) are provided at a horizontal spacing that is not larger than the width of the section into which the photoelectric conversion region is partitioned (fig. 5.)

Regarding claim 4, Kiik teaches all the limitations of claim 4 (see the 102 rejection to claim 2 supra), including teaching a solid-state imaging device wherein a plurality of solid-state imaging blocks of substantially the same shape are arranged next to one another in the horizontal direction (fig. 5), each solid-state imaging block comprising: one of the sections into which the photoelectric conversion region has been partitioned (fig. 5); one horizontal transfer path for receiving signals from this section (fig. 5 indicator 112); and one read-out amplifier for receiving signals from this horizontal transfer path (fig. 5 indicator 108.)

Regarding claim 5, Kiik teaches all the limitations of claim 5 (see the 102 rejection to claim 2 supra), including teaching a solid-state imaging device wherein the vertical charge transfer paths are arranged at the horizontal pitch A (fig. 5 and 6) also where the sections into which the photoelectric conversion region has been partitioned border onto one another (fig. 5.)

Regarding claim 6, Kiik teaches all the limitations of claim 6 (see the 102 rejection to claim 1 supra), including teaching a solid-state imaging device wherein a horizontal width of the vertical charge transfer paths is substantially constant from a portion at the

photoelectric conversion region to a portion at the horizontal charge transfer portion (fig. 1, 3 and 4.) (See *Claim Objections* supra.)

Regarding claim 12, Kiik teaches all the limitations of claim 12 (see the 102 rejection to claim 1 supra), including teaching a solid-state imaging device wherein the largest bending angle in the vertical charge transfer paths is not more than 45° (fig. 5.)

Regarding claim 13, Kiik teaches an imaging system, comprising: the solid-state imaging device of Claim 2 (see the 102 rejection to claim 2 supra); and a signal processing portion that synthesizes output from the read-out amplifiers of the sections of the solid-state imaging device, and corrects the image at joint portions corresponding to portions where the sections border with one another, so as to display one image (col. 3 lines 18-23.)

Claim 7 is rejected under 35 U.S.C. 102(b) as being anticipated of Furumiya (US #5,742,081.)

Regarding claim 7, although claim 7 is dependent on claim 1, it presents claim elements that do not further limit claim 1, but instead present substitute elements (see *Claim Objections* supra.) Therefore, for the purposes of examination, this claim has been interpreted to include all of the limitations of claim 1, with exception to the elements as substituted by claim 7. Accordingly, Furumiya is found to teach a solid-state imaging device, as provided by claim 1, comprising:

a photoelectric conversion region including (fig. 1(a) and 4):

a plurality of photoelectric conversion portions arranged in rows and columns extending in a vertical direction and a horizontal direction (fig. 1(a) and 4 indicators 1; col. 7 lines 55-60); and

a plurality of vertical charge transfer paths extending substantially in parallel to the columns of the photoelectric conversion portions (fig. 1(a) and 4 indicator 3; col. 7 lines 55-67); and

a horizontal charge transfer path for receiving signals from the plurality of vertical charge transfer paths (fig. 1(a) and 4 indicator 5; col. 7 line 64 – col. 8 line 2);

Furthermore, although Furumiya does not teach a solid state imaging device, as provided by claim 1, wherein the plurality of vertical charge transfer paths is arranged at a horizontal pitch A within the photoelectric conversion region, and at a pitch B that is smaller than the pitch A in a portion where the signals are input into the horizontal charge transfer path, Furumiya does teach a solid state imaging device, as provide by claim 7, wherein a horizontal width of the vertical charge transfer paths increases gradually or step--wise from a portion at the photoelectric conversion region to a portion at the horizontal charge transfer portion (fig. 1(a) and 4; col. 7 line 55 – col. 8 line 8; col. 9 line 62 – col. 10 line 21.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiik et al. (EP #0 866 502 A2) in view of Morcom (US #4,835,616.)

Regarding claim 8, Kiik teaches all the limitations of claim 8 (see the 102 rejection to claim 1 supra), except teaching a solid-state imaging device wherein a plurality of transfer electrodes are arranged above the vertical charge transfer paths are wired such that, at least in bent portions of the vertical charge transfer paths, transfer driving pulses can be applied independently from other portions of the vertical charge transfer paths. Morcom teaches a solid-state imaging device wherein a plurality of transfer electrodes (fig. 1) are arranged above the vertical charge transfer paths (fig. 1 indicator 1) and are wired such that (fig. 1 indicators $I\Phi_n$ and $S\Phi_n$), in the storage portions of the vertical charge transfer paths (fig. 1 indicator 11), transfer driving pulses can be applied independently from other portions of the vertical charge transfer paths (col. 3 lines 16-30.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the electrode/path configuration and clocked transfer driving pulses as taught by Morcom, with the solid-state imaging device as taught by Kiik. One of ordinary skill in the art at the time the invention was made would be motivated to employ this combination to form a solid-state imaging device which is

able to first vertically transfer the charge from the imaging portion to the storage portion (with the bent portion serving as a storage section), before the charge is eventually transferred out of the storage section via the horizontal transfer path.

Regarding claim 9, Kiik teaches all the limitations of claim 9 (see the 102 rejection to claim 1 supra), except directly teaching a solid-state imaging device wherein a plurality of transfer electrodes are arranged such that bent portions of the vertical charge transfer paths are positioned below locations between the transfer electrodes (fig. 5 and 6.) However, Kiik does teach a solid-state imaging device comprising a rectangular imaging section (fig. 5 indicator 102; col. 8 lines 10-31) with parallel vertical charge transfer paths, and a non-rectangular storage section (fig. 5 and 6) consisting of the bent portions of the vertical charge transfer path (fig. 5 indicator 210, fig. 6.) Morcom teaches transfer electrodes being positioned above vertical transfer paths (fig. 1), with the break between the imaging and storage sections occurring below locations between the transfer electrodes (fig. 1.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the layout with the break between imaging and storage sections coinciding with breaks between transfer electrodes as taught by Morcom, with the solid-state imaging device as taught by Kiik. One of ordinary skill in the art at the time the invention was made would be motivated to employ this design to maintain a rectangular imaging area, that is separate from a non-rectangular storage section; with each section controlled by separate and distinct transfer driving pulses.

Regarding claim 11, Kiik teaches all the limitations of claim 11 (see the 102 rejection to claim 1 supra), except for teaching a solid-state imaging device wherein a conducting line that is electrically connected to a plurality of transfer electrodes with which the transfer driving pulse is applied to the vertical charge transfer paths is provided substantially in parallel to the vertical charge transfer paths at least from a photoelectric conversion region to a region in which the vertical charge transfer paths are arranged with less than the horizontal pitch A. Morcom teaches a solid-state imaging device wherein a conducting line (fig. 1 indicators 5 and 7) that is electrically connected to a plurality of transfer electrodes (fig. 1) with which the transfer driving pulse (fig. 1 indicators $I\Phi_n$ and $S\Phi_n$) is applied to the vertical charge transfer paths is provided substantially in parallel to the vertical charge transfer paths in both the imaging and storage sections (fig. 1.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the conducting lines as taught by Morcom, with the solid-state imaging device as taught by Kiik. One of ordinary skill in the art at the time the invention was made would be motivated to make this combination in order to provide transfer driving pulses to both the imaging ('502, fig. 5 indicator 102) and storage sections ('502, fig. 5 indicator 210.)

Claim 7 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Kiik et al. (EP #0 866 502 A2) in view of Furumiya (US #5,742,081.)

Regarding claim 7, Kiik teaches all the limitations of claim 7 (see the 102 rejection to claim 1 supra) except teaching a solid-state imaging device wherein a

horizontal width of the vertical charge transfer paths increases gradually or step--wise from a portion at the photoelectric conversion region to a portion at the horizontal charge transfer portion. Furumiya teaches a solid-state imaging device wherein a horizontal width of the vertical charge transfer paths increases gradually or step--wise from a portion at the photoelectric conversion region to a portion at the horizontal charge transfer portion (fig. 1(a) and 4; col. 7 line 55 – col. 8 line 8; col. 9 line 62 – col. 10 line 21.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the transfer path widening as taught by Furumiya, with the solid-state imaging device as taught by Kiik. One of ordinary skill in the art at the time the invention was made would be motivated to use widening of vertical transfer paths in order to decrease the potential barrier, thereby preventing transfer failures of the signal charge (col. 8 lines 2-8.)

Allowable Subject Matter

Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Itakura (US #5,491,512) and Konuma (US #5,748,232) disclose solid-state imaging and driving methods for the same.

Elabd (US #4,575,763) discloses narrowing charge transfer channels.

Miwata (JP #361194870A) discloses widening charge transfer channels.

Hasegawa (JP #08335689A) discloses widening charge transfer channels.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary C. Vieaux whose telephone number is 703-305-9573. The examiner can normally be reached on Monday - Friday, 8:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber can be reached on (703) 305-4929. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Gary C. Vieaux
Examiner
Art Unit 2612

5 Gcv2

NGOC-YEN VU
PRIMARY EXAMINER